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Helicogonium fusisporum sp. nov., an intrahymenial parasite in *Orbilia eucalypti*

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Abstract — *Helicogonium fusisporum*, an intrahymenial ascomycete that forms its ascogenous hyphae and asci in the hymenium of *Orbilia eucalypti* (= *O. coccinella* s. auct. = *O. alnea*), is illustrated and described as a new species from Lithuania.

Key words — ascomycetes, taxonomy, mycoparasite

Introduction

Species of the genus *Helicogonium* W.L. White live as parasites in hymenia of other fungi where they suppress the formation of the host's meiosporangia. They are considered to originate phylogenetically from *Helotiales* but with a loss of ability to form apothecia (Baral 1999).

These species can hardly be detected other than by accident. Although they are certainly not very rare, it is very difficult to search intentionally for them because their presence in the fruitbodies of their hosts (ascomycetes and basidiomycetes) is generally not obvious by external view, and their occurrence is usually irregular and unpredictable. Probably, *Helicogonium* asci have been repeatedly observed by mycologists who put the material aside because the strange combination of ascus and apothecial characters did not fit any described species.

Most species of *Helicogonium* occur as parasites of various genera in the *Helotiales*, whereas only one species, *H. orbiliarum* Baral & G. Marson, was

formerly known to occur in members of *Orbiliomycetes* (Baral 1999). The new species described here is the second one to be found in hymenia of the genus *Orbilia* Fr. (but a third one is mentioned below). It has so far been detected only once, and in spite of a thorough search in Lithuania over a two-year period in more than 30 collections of *Orbilia,* the second author did not succeed in finding it again. Also, the examination of roughly 4500 specimens of *Orbiliomycetes* by the first author and about 100 specimens by the second author during a period of over 20 years never brought this parasitic species to light.

Material and methods

The type material was studied by both authors in the dead state (the sign † refers to this). Freehand sections made with razor blade and also squashed material were mounted in tap water, 5% aqueous KOH, Lugol's solution (IKI) and aqueous Congo Red (CR) for microscopic examination. Line drawings of microscopical structures were made free-hand directly from the microscope. Photos were obtained with a Nikon Coolpix 4500 digital camera held free-hand on the 10x ocular of a Zeiss Standard 20 microscope. The material is deposited in the Herbaria of the Botanische Staatssammlung München (M) and Institute of Botany, Nature Research Centre, Vilnius (BILAS).

Taxonomic description

Helicogonium fusisporum Baral & Kutorga, **sp. nov.** Figs 1–2

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Ascomata nulla. Asci in hymenio hospitis formati, 30–47 × (6–)6.5–7.5(–8) µm in statu emortuo, cylindraceo-clavati, tunica apicali incrassata, inamyloidea, octospori, breviter stipitati, plerumque bifurcati, non uncinati. Ascosporae fasciculatae, oblique biseriati, fusoideae, rectae, (7.5–)9–11(–12) × 2–2.5 µm in statu emortuo, non-septatae, guttulis magnis impletae, ascoconidiis carentes. Habitatio: in apotheciis Orbiliae eucalypti.

Type: 55°04'71.7" N, 24°23'74.0" E, Upninkai Forest, Jonava district, Lithuania alt. 122 m., on a xeric still-attached *Quercus robur* branch in apothecia of *Orbilia eucalypti* growing on old ascomata of *Colpoma quercinum*, 2.IX.2004, E. Kutorga (**Holotype** – M (ex *H.B.8533*); **Isotype** – BILAS *42681*).

Etymology: referring to the fusoid ascospores.

Description — Ascogenous hyphae penetrating the medullary excipulum and subhymenium of the host, simple-septate. Asci (†) 30–47 × (6–)6.5–7.5 (–8) µm, cylindric-clavate to clavate, 8-spored; apex slightly to medium conical, with an apical dome 2–3 µm (immature) or 1–2 µm (mature) thick in KOH, inner surface plane or usually distinctly convex, without apical chamber, IKI–, usually not exceeding the paraphyses of host in height (dead state); stalk short to medium long, medium thick, bifurcate (Y to L-shaped), without croziers. Ascospores (†) (7.5–)9–11(–12) × 2–2.5 µm, fusoid to fusiform, with gradually

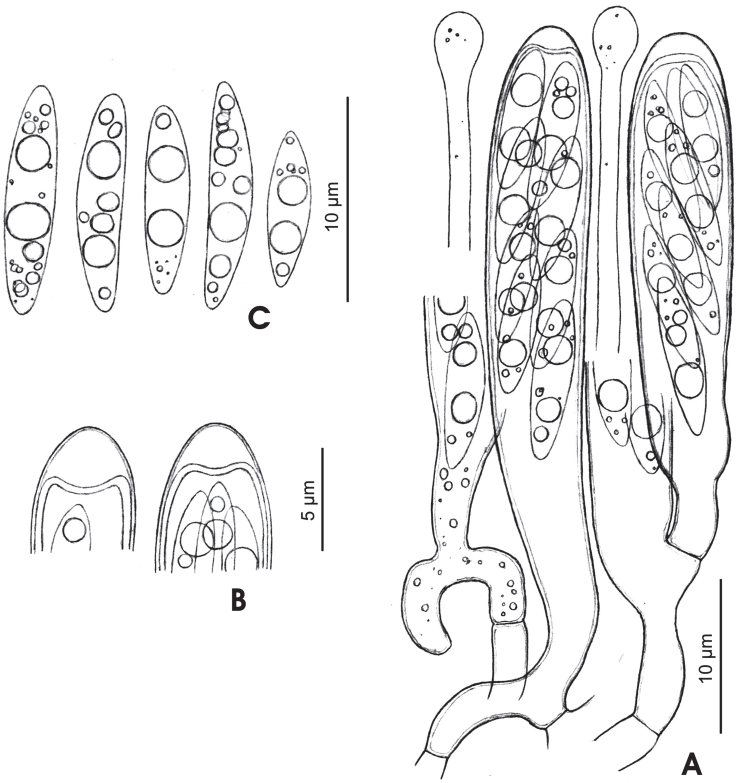

Fig. 1. *Helicogonium fusisporum* (holotype, all in KOH, KOH+IKI or KOH+CR).
A: asci (between paraphyses of *Orbilia eucalypti*),
B: ascus apices, C: ascospores containing lipid bodies (oil drops).

tapered, obtuse to acute ends, homopolar, straight to often slightly inequilateral, non-septate, containing some large and small oil drops (high lipid content).

Anamorph not detected. Conidia born on ascospores not observed, either on free spores or on spores within the asci.

Ecology, and range — mycoparasite in the hymenium of *Orbilia eucalypti* (W. Phillips & Harkn.) Sacc., which grew on decayed ascomata of *Colpoma quercinum* (Pers.) Wallr. on 6–9 mm thick, dead, corticated branches attached to a *Quercus robur* tree, ca. 1.5–2 m above the ground in a ca. 70 year old *Pinus sylvestris* stand with scattered *Betula pendula*, *Picea abies*, and *Quercus robur*. So far only known from type locality.

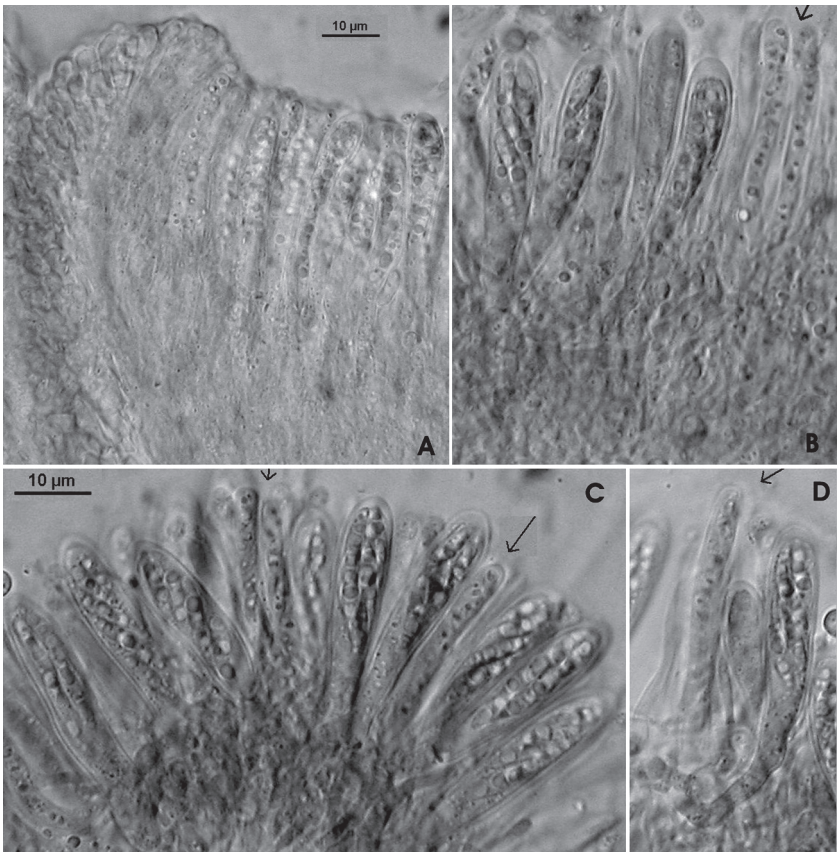

Fig. 2. Asci of *Helicogonium fusisporum* in hymenium of host apothecium (holotype, all in KOH+CR). Arrows: narrow asci of the host *Orbilia eucalypti*.

Discussion

In 2006, apothecia of *Orbilia eucalypti* (= *Orbilia coccinella* s. auct., = *O. alnea* Velen.) were collected again at the same site on very similar *Quercus* branches with old *Colpoma* ascomata, but no asci of this parasite could be detected in the examined apothecia.

Helicogonium fusisporum forms its asci between the paraphyses and asci of the host species *O. eucalypti*. In the apothecia tested, the parasitic asci were present in similar frequency to those of the host. Toward the margin of the apothecia the parasitic asci are fewer. The host asci with their small ellipsoid spores are distinctly narrower than the parasitic asci, while the parasitic asci tend to project more than the host asci (both in the dead state).

Orbilia eucalypti is a common species on attached branches or standing trunks in temperate humid to subtropical semi-humid climates. Its apothecia are desiccation-tolerant for at least 1–2 months, but much less tolerant populations of apparently the same species occur on substrate lying on the moist ground. The occurrence of *Helicogonium fusisporum* and its host on rather thin branches at eye height provides evidence that this parasite also is a desiccation-tolerant fungus. Because the specimen was studied only 1–2.5 years after collecting, no observations of the living organs could be made, therefore its desiccation-tolerance is indirectly inferred.

H. fusisporum resembles in ascospore shape *H. psilachni* Baral, a parasite in the hymenium of *Psilachnum* aff. *chrysostigmum* (Fr.) Raitv., but in *H. psilachni* the spores are shorter, much more clavate, and produce ascoconidia at their broad end while still inside the immature asci. The type species of *Helicogonium*, *H. jacksonii* W.L. White, parasitic in *Corticiaceae*, differs in septate, broader, eguttulate ascospores forming ascoconidia.

Three *Helicogonium* species are presently known to grow parasitically in *Orbilia*. The second, *H. orbiliarum,* is quite common, being so far recorded in seven different species of *Orbilia* (including *O. eucalypti*) as well as in some *Helotiales*, viz. *Calloria* Fr., *Cyathicula* De Not., and *Parorbiliopsis* Spooner & Dennis (Baral 1999). That species is readily recognized by globose to broadly ovoid ascospores containing a few ± small lipid bodies, and the spores form small ellipsoid ascoconidia that, prior to ejection, aggregate in 8 "warted" balls within the living mature asci. A third species, *H.* cf. *hyaloscypharum* Baral, resembles *H. orbiliarum* but differs in more elongate ellipsoid-clavate ascospores producing curved (cashew-shaped) ascoconidia. This species is usually found in hymenia of *Hyaloscypha* Boud. in Europe, although a single known collection from China was detected in an *Orbilia* (*O.* cf. *crenatomarginata* (Höhn.) Sacc. & Trotter (Hongyan Su pers. comm.).

During monographic work on the *Orbiliomycetes*, one of us (H.B.) had the opportunity to revise type materials of *O. coccinella* Fr. in Herb. UPS, as well as such of *O. eucalypti* (W. Phillips & Harkn.) Sacc. in K and *O. alnea* Velen. in PRM. It was found that the type of *O. coccinella* possesses 16-spored asci and cashew-shaped ascospores, which is very different from the current concept of that taxon that includes 8-spored asci and ellipsoid ascospores. *Orbilia eucalypti* was found to be conspecific with *O. alnea* and is, therefore, adopted as the oldest available name for *Orbilia coccinella* s. auct., the taxon with ellipsoid ascospores.

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